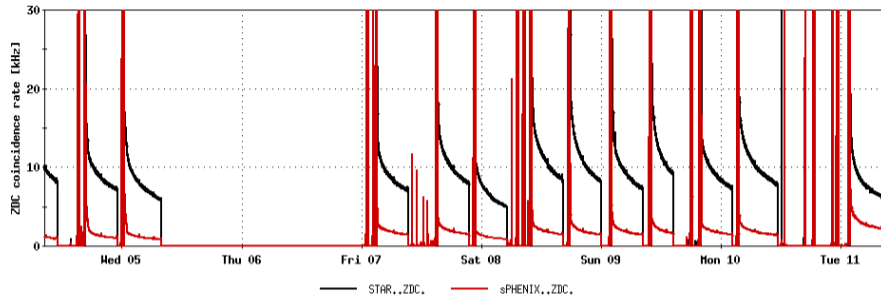


# RHIC Status

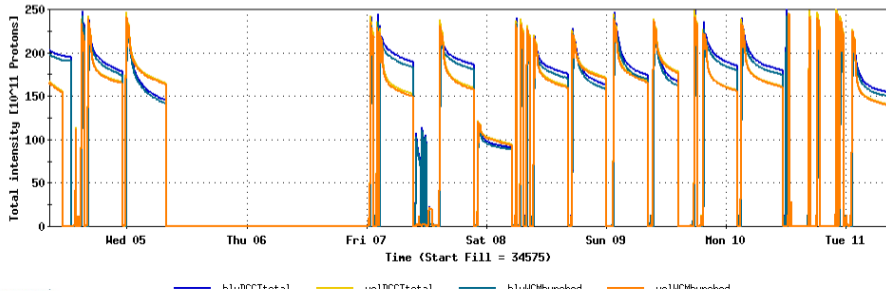
Kiel Hock

June 11", 2024

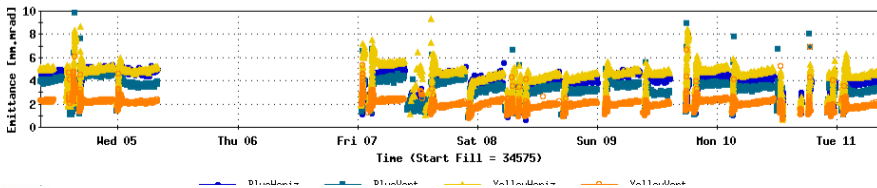
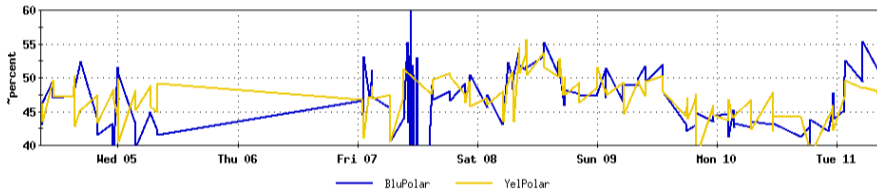
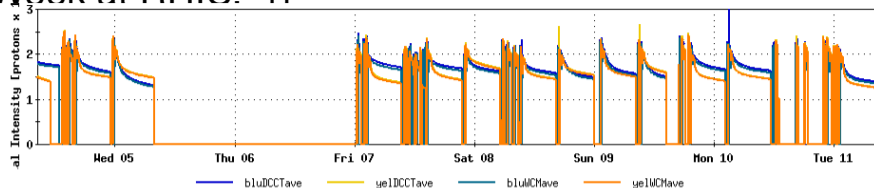
# Last Week at RHIC



RHIC Beam Intensity



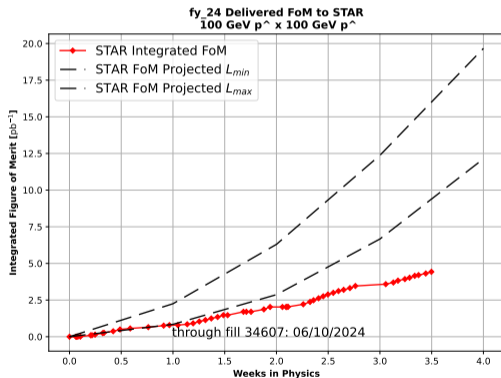
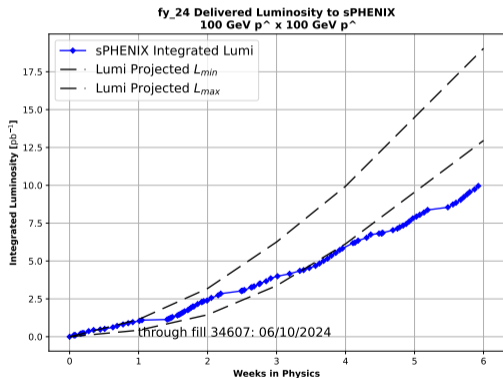
# Last Week at RHIC. II



# RHIC status and Lumi Projections

→ 111x111 physics running since 4/30.

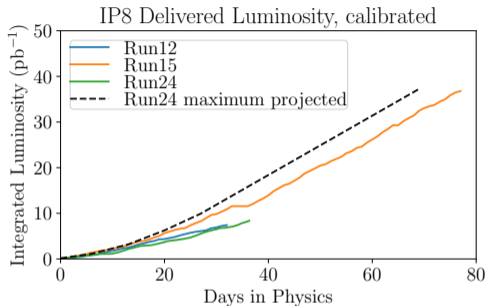
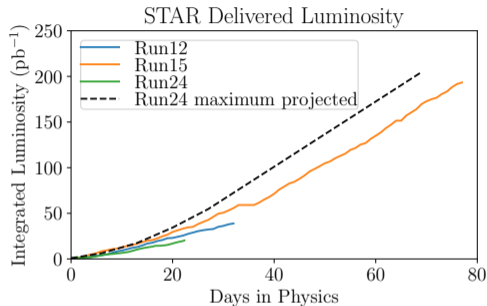
## Preliminary luminosity accounting



# RHIC Status

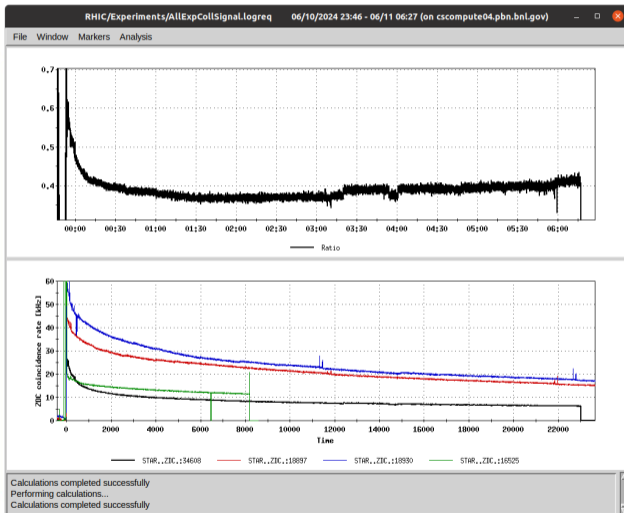
- physics running with  $2.0 \times 10^{11}$ /bunch at store
- we are now at the end of the "ramp up" period so luminosity projections are constant
- integrated luminosity still a factor of 2 off from best Run15 stores
- polarization up into the 40-55%, equal in both rings following MD last week
  - blue  $\nu_s$  moved down 0.015 to get in range of 0.5 to 0.5025
- RHIC has been ODH1 for the last week, requiring additional work planning and PPE for entrance
- AGS MMPS exciter PS had failed resulting in almost 24 hours of downtime (two circuit boards replaced).
- Both 56 MHz FPCs have been fully inserted
- power dip Sunday due to bad termination on 138 kV line.
- cold snake has increase heat load
  - warmup tomorrow to try and clear possibly contaminants from cold head 5
- APEX Tomorrow, 6/12

# Comparison with previous runs



- Run15 and Run12 scaled based off of emittances and calculated crossing angle
- A factor of 2 improvement would put STAR at the projected Luminosity/day
- sPHENIX needs  $\sim 60\%$  increase

# Comparison with previous runs, II

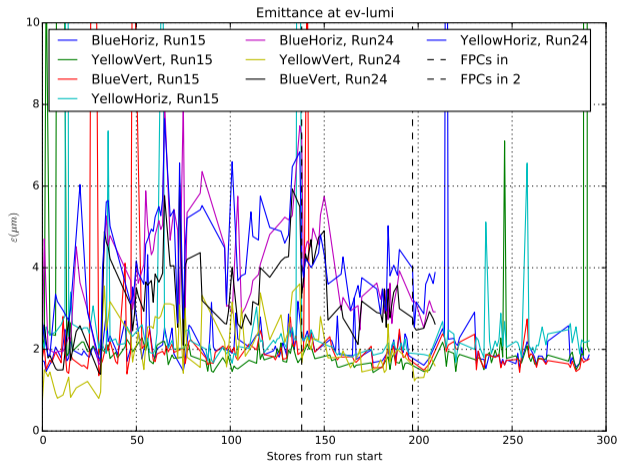


- 18930 is best store of Run15
- 18897 is arbitrary good store from Run15
- 16525 is best store of Run12
- 24608 is arbitrary good store from Run24

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- Luminosity lifetime is worse now than Run12 and Run15
- Initial rates are above Run12
- ZDC rates at store are 40% of good Run15 rates

# Comparison with previous runs, III



→ Emittances are currently 1.5-2x higher than run15 at ev-lumi

→ Inserting the 56 MHz FPC greatly improved the intensity dependent emittance growth

→ following IP4 scan and test ramps yesterday, there are two conclusions

→ effects from 56 MHz are now largely suppressed

→ emittance growth no longer intensity dependent



# Moving Forward

To improve luminosity:

- $\beta^*$  squeeze MD
- investigate collapse of IP8+IP6 bumps at different times
- iterate on ramp chromaticity following ramp optics measurements
- test Run22 ramp clone to 100 GeV
- continue optimizing store lifetime
- advance intensity

To improve polarization

- measure spin tune of blue at injection to verify:
  - nominal snake rotation at injection
  - spin match from AGS to RHIC

Request 4 hours of MD for Thursday 1000-1400.

# Physics Checkpoints

- $\beta$  squeeze at IP8
- 1.0e11 protons per bunch @physics
- complete low-luminosity run for STAR
- sPHENIX running with nominal store conditions
- 1.7e11 protons per bunch @physics (Run12 maximum)
- 2.0e11 protons per bunch @physics
- 2.4e11 protons per bunch @physics (Run15 maximum)
- 2.4e11 protons per bunch and 60% polarization @physics (Run15 maximum)
- switch to alternate AGS setup
- 2.5e11 protons per bunch @physics
- 3.0e11 protons per bunch @physics